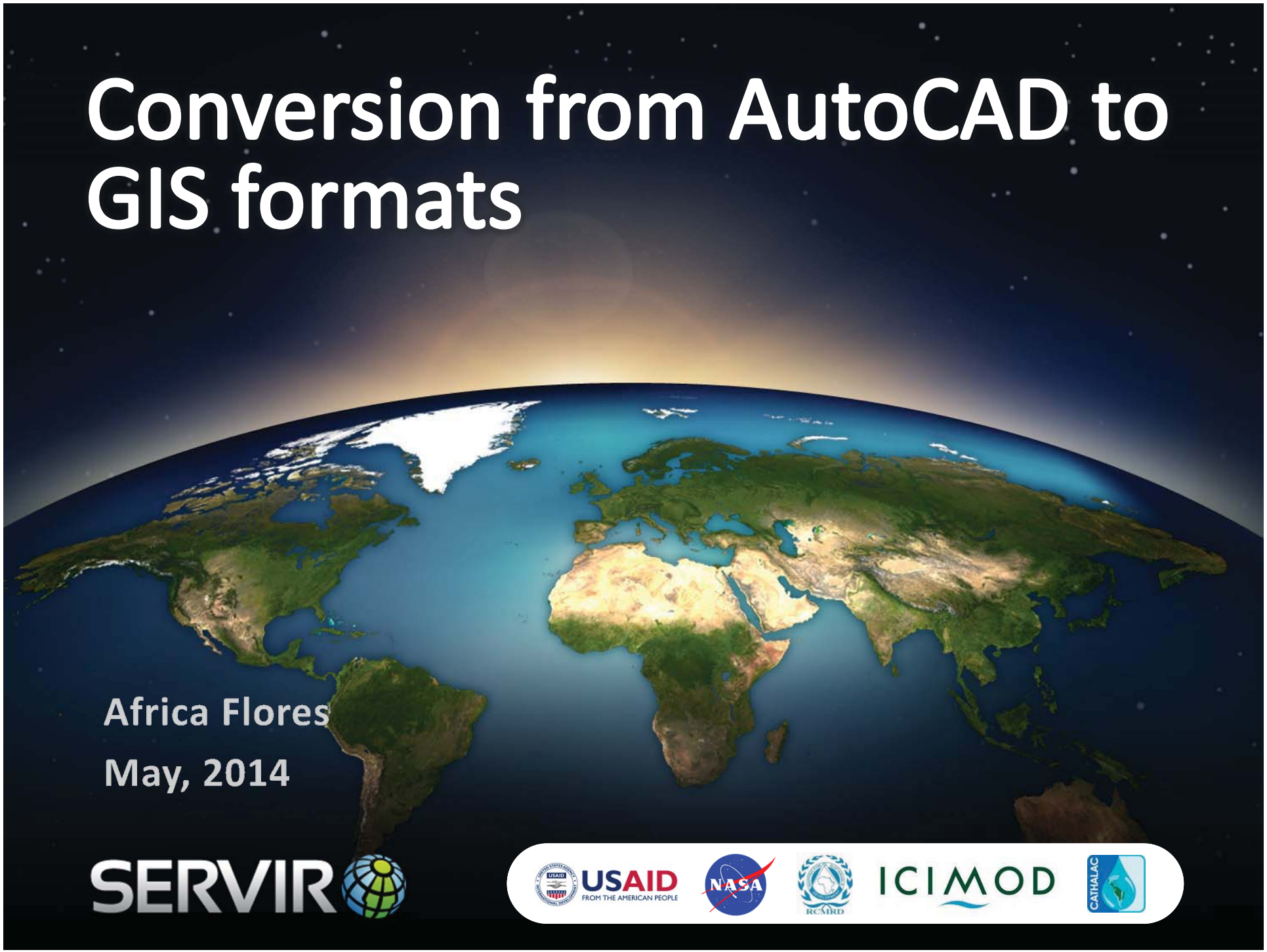
Conversion from AutoCAD to GIS formats



Africa Flores

May, 2014

SERVIR

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ICIMOD

CATHALAC

Computer Aided Drafting (CAD)

- Characteristics (.dwg):
  - Very accurate drawings
  - Based on a ground survey done by a certified professional surveyor (often)
  - CAD features are organized by layers,
    - Points
    - Lines
    - Polygons
    - Annotations

  Complications to transform to a GIS file
  - No accepted named convention for CAD layers or length restriction for CAD layer names
  - “No Clean” CAD files
    - Stray or remnants pieces (lines or points)
  - Identify CAD drawing’s coordinate system

Geographic Information Systems
GIS shapefiles

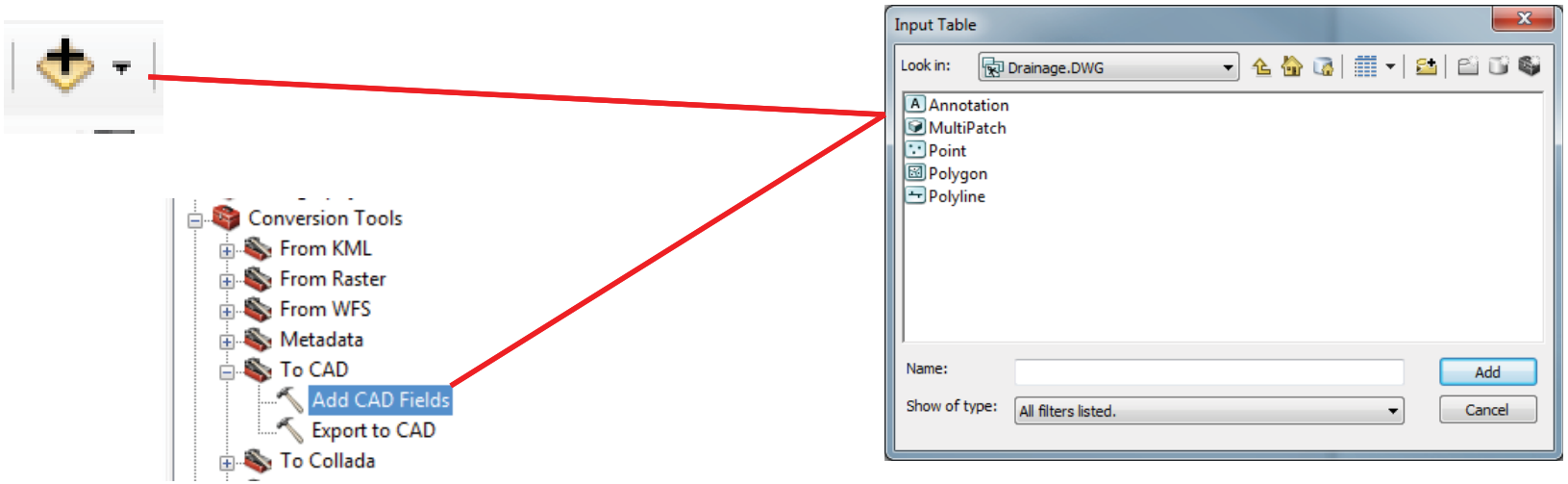
- GIS: Any information system (hardware, software, data) that integrates, stores, edits, analyzes, shares and displays "geographic" information (EPA 2014, ESRI 2014)

- Shapefile Characteristics (*.shp, *.shx, *.dbf, *.prj, *.shp.xml):

  - Represents geometric features: points, lines, polygons
  - Digital **vector** storage format
  - A shapefile encompasses a set of several files (*.shp, *.shx, *.dbf, *.prj, *.shp.xml)
  - The attributes of a shapefile are stored in a table, which specifies/describe what the line, point or polygon represent (it could contain large amount of information)
  - It is geolocated, every feature in GIS has geographic information associated that allows to identify its position in the Earth

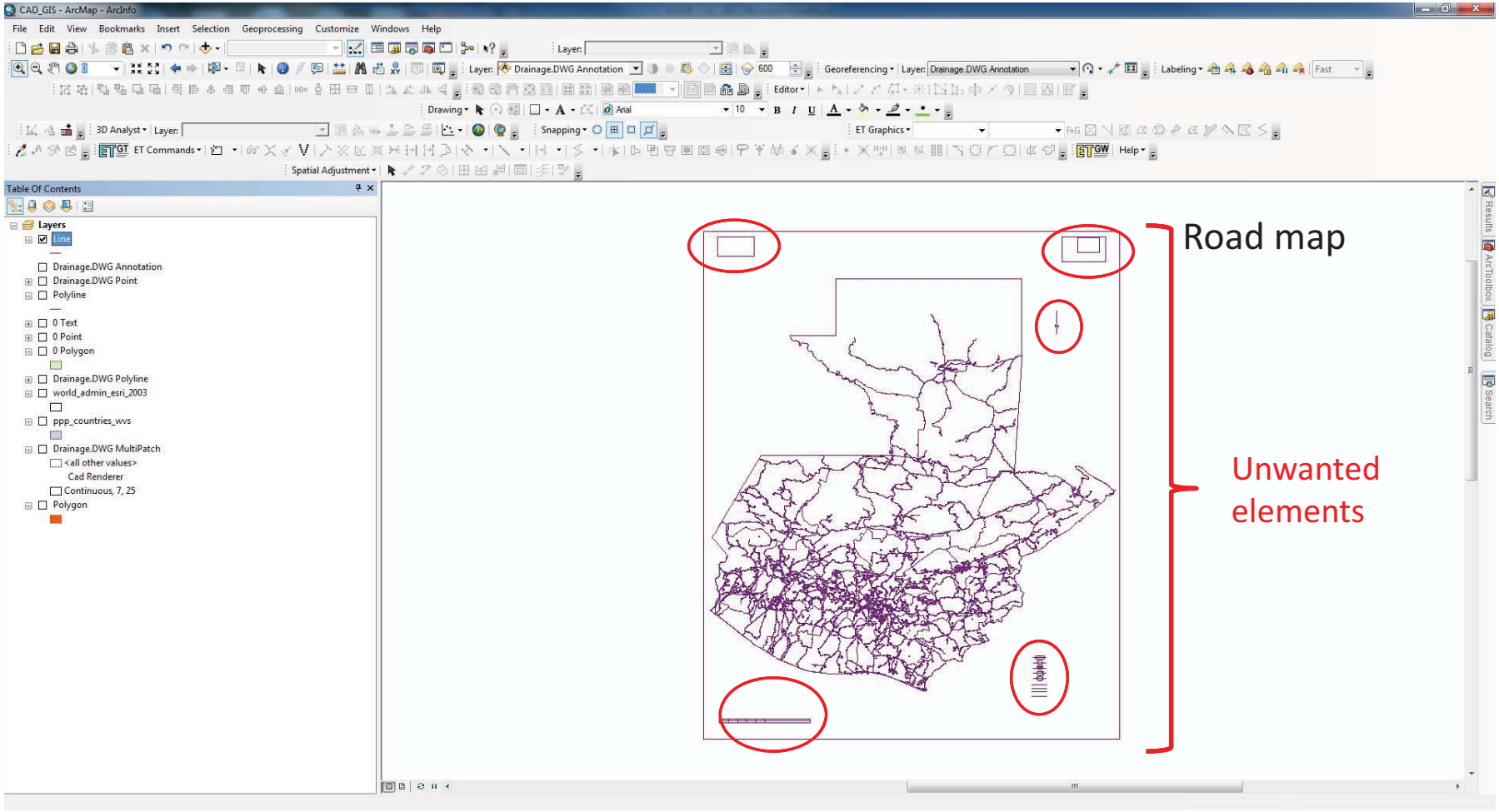
Exporting CAD to ArcGIS

- Account for:
  - Familiarity with GIS concepts: projections, coordinate systems and datums
  - Understand source and target projecting
- CAD files can be immediately displayed in ArcGIS



Reading CAD files in ArcGIS

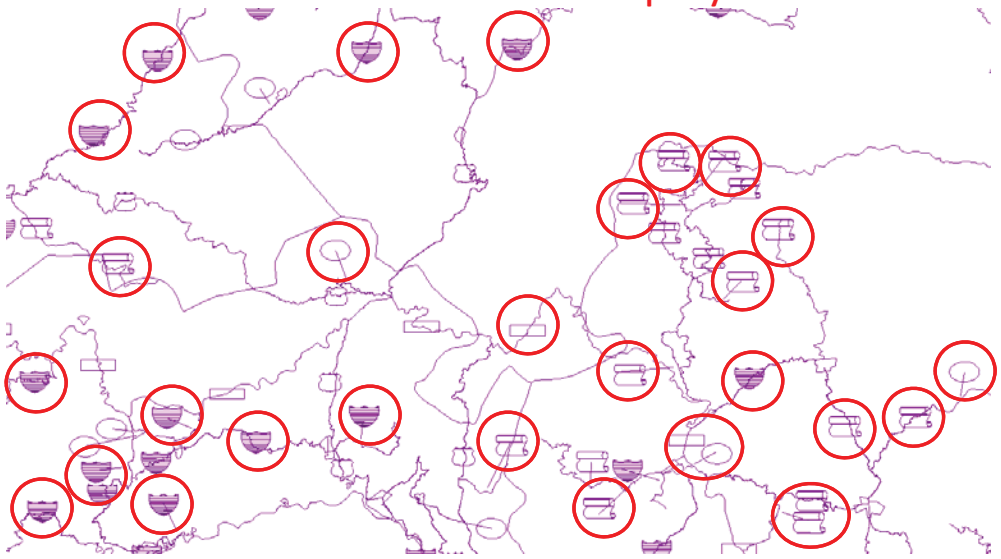
What do we mean by cleanup layers?



Conversion from CAD to GIS

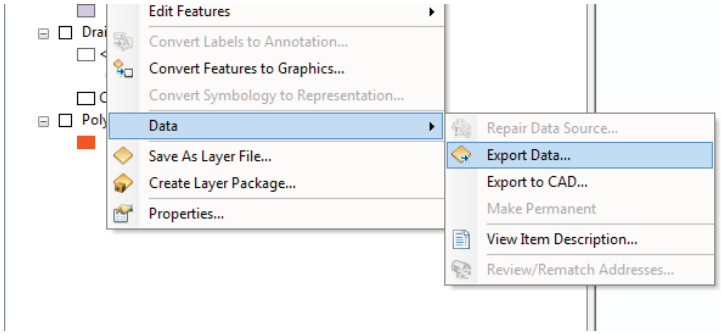
- What do we mean by Clean CAD layers
  - Road file

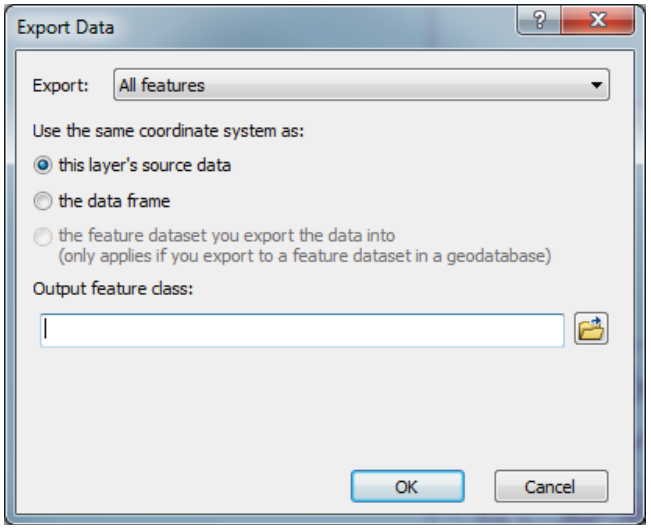
Unrelated features
Read as line in ArcGIS because CAD developer did not close the polyline to create a polygon



Conversion from CAD to GIS

- The data is displayed in the Dataview of ArcMap is only temporary, it is not a GIS layer yet
- To create a shapefile you can:
  - Export data





Remember, the data has to have a coordinate system/projection defined in GIS. You can either, define a projection or reprojected.

If after defining the projection the data is still not well aligned with a correctly georeferenced data you can spatially adjust the shapefile

When working with CAD

- Take into consideration the following:
  - Record drawing information and begin Metadata documentation (drawing author, technician, source, name, scale, surveyor, coordinates, extents, layer name and descriptions, dates of reference, etc)
  - Determine your data needs: define which layers are really needed to be converted to GIS. Create a new CAD drawing only with the desirable datasets
  - Erase unwanted elements (titleblocks, borders, legends, etc)
  - Use clear CAD Layer Names: this is for clarification
  - Clean CAD Layers: verify that all features are on their respective layers. ERASE those elements that do not belong on the layer
  - Determine CAD Coordinate System: This information is needed to correctly align within GIS

- What platform is used by your institution to create CAD layers?

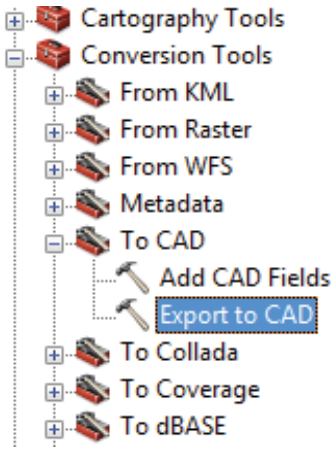
Source: http://mms.nps.gov/gis/applications/documents/cadgis_rev1d.pdf

From GIS to CAD

- Two methods for CAD conversion from the ArcGIS toolbox:
  - Conversion tools> To CAD

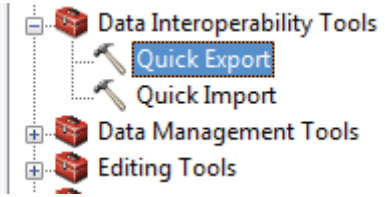
    Use for vector information

    (points, lines and polygons)



  - Data interoperability Tools> Quick Export

    Use for Annotation Conversion to CAD text



Preparation of my GIS Environment for Conversion

- Set **Coordinate System** and **Units** of ArcGIS Data Frame
- **Naming of GIS Layers** in ArcMap Table of Contents
- **Filtering Unnecessary Data Records** via Query Filters or Spatial View
- **Registering** New Spatial Views with Geodatabase
- **Conversion** of Label Text to Annotation Layer (in
- Database Format)
- Request or Identify **CAD Seed File** to Use in Conversion Process

Source: Anoubon, A. 2010. GIS Brown Bag: Spatial Data Interoperability and Conversion to CAD

Seed file

- **What is it?**

  A seed file is template CAD file, which sets the point of origin and working units of the converted GIS data.

- **How does it affect my output CAD file?**
  - If a seed file is not used, then the default seed file from within ArcGIS will be used. It is essential to make sure the units match, and that a 3D seed file is used to capture 3-dimensional geometry features. A set of default seed files has been prepared and distributed with the SMS install of the ArcGIS Desktop software as follows:

  - C:\Program Files\ArcGIS\ArcToolbox\Templates\template2d.dgn (2D, meters)
  - C:\Program Files\ArcGIS\ArcToolbox\Templates\template3d.dgn (3D, meters)
  - C:\Program Files\ArcGIS\ArcToolbox\Templates\template2d_ft.dgn (2D, feet)
  - C:\Program Files\ArcGIS\ArcToolbox\Templates\template3d_ft.dgn (3D, feet)

Incorrect use of a seed file can result in data being listed in the wrong coordinate system and units, and may mean that the data cannot be spatially referenced with other CAD drawings being used by project engineers.

Source: Anoubon, A. 2010. GIS Brown Bag: Spatial Data Interoperability and Conversion to CAD

References

- Shapefile
- http://www.esri.com/library/whitepapers/pdfs/shapefile.pdf
- Exercises
- http://www.gsd.harvard.edu/gis/manual/cad/#download

Thank you!
Questions?

References SDI

- IDE Guatemala
- https://www.youtube.com/watch?v=1BrmgmK6OwE
- General NSDI
- http://www.fgdc.gov/nsdi/nsdi.html
- http://www.fgdc.gov/nsdi-plan/nsdi-strategic-visioning-workshop-march-2013/nsdi-spot-matrix-030513.pdf